Nonlinear Computational Biomechanics of the Hip
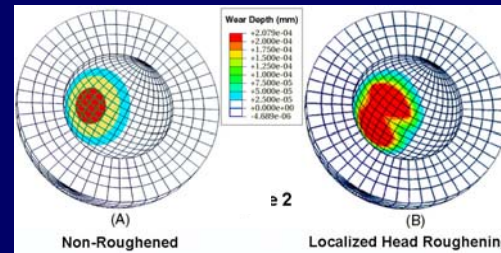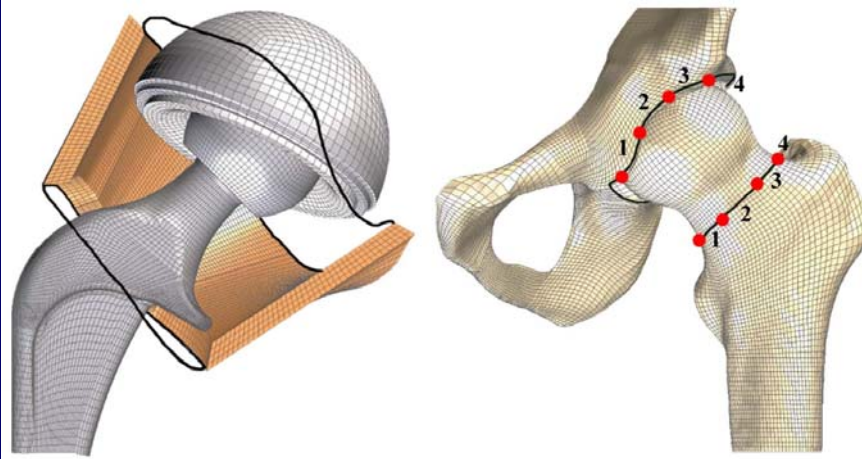
U. of Iowa - Iowa State U. - Implex Corp.

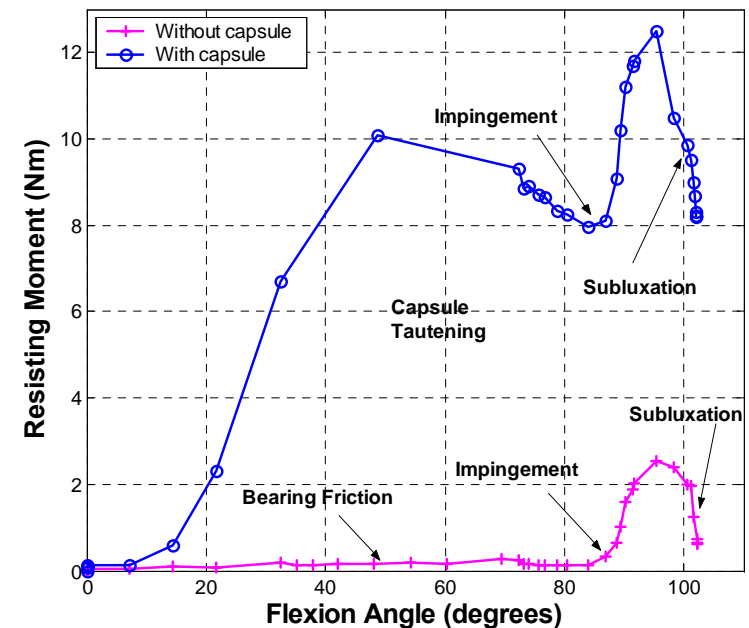(A) Non-Roughened (B) Localized Head Roughening

UHMWPE

- **Wear of UHMWPE**

  Direction-dependent FEA sliding distance-coupled model of total hip wear
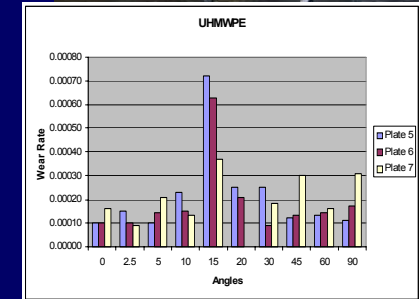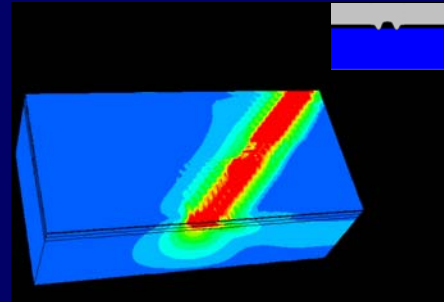
- **THA Dislocation**

  Capsule representation in a large-displacement sliding FEA model

•Intra-Articular Fractures

Voxel-based patient-specific FEA and DEA models of aberrant contact stresses
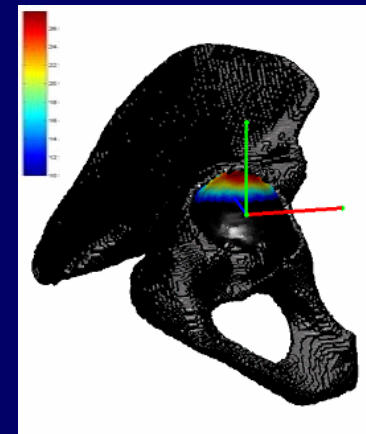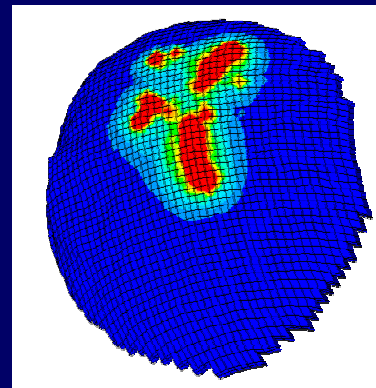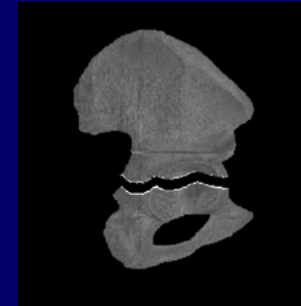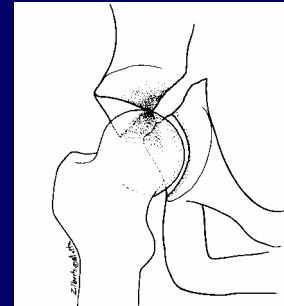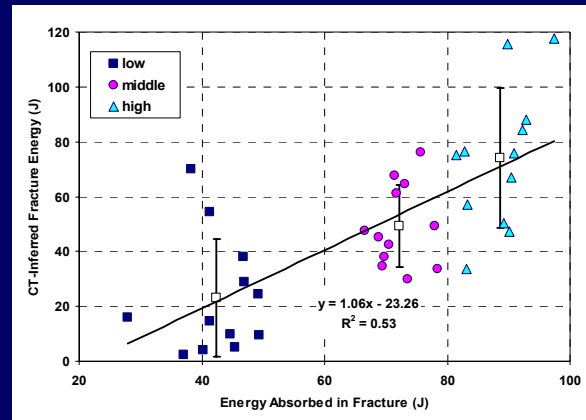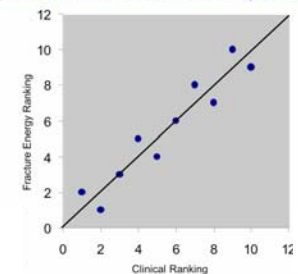
Image analysis of injury severity – free surface energy of fragments
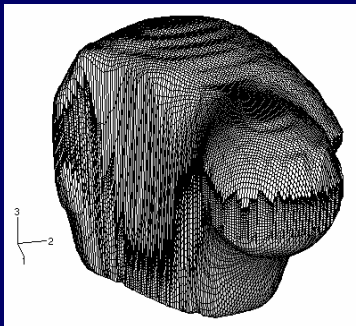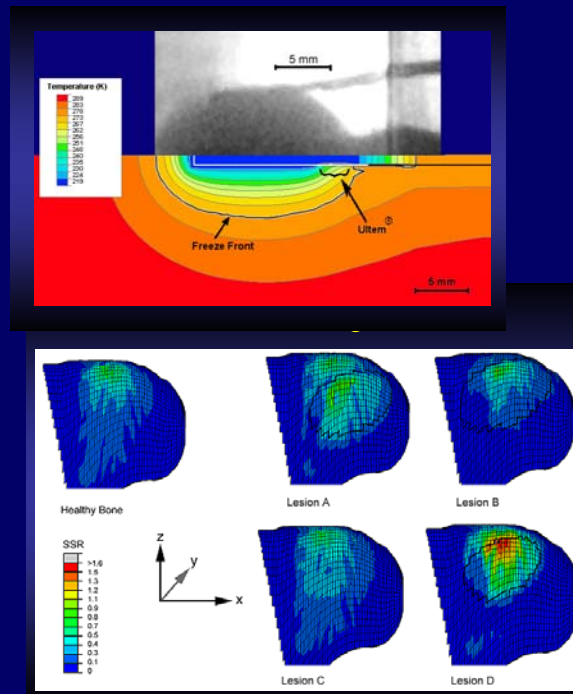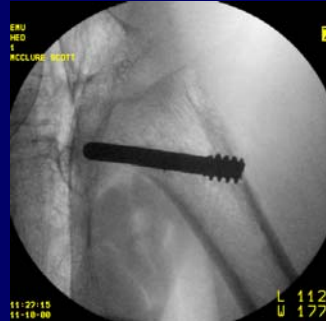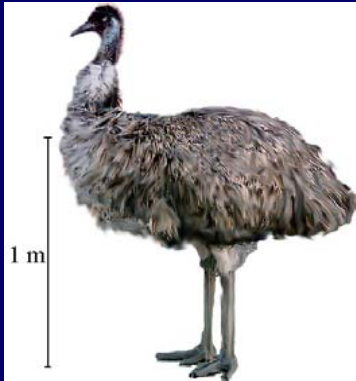

Clinical Correlations (energy)

Emu Model of Osteonecrosis

Finite element & *in vivo* studies of a new implant to prevent femoral head collapse.

Developmental Hip Dysplasia

Patient-specific FE contact models zoned from contrast-enhanced CT at 40-year follow-up